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PATENTREMARKS

Reconsideration and continued examination is respectfully requested in view of the amendments and remarks.

Examiner's Telephonic Interview.

The Applicants wish to thank the Examiner for his time and consideration during the telephonic interview conducted on March 29, 2004 with the Applicants' representatives. During the interview the relevancy of the Tavender reference was discussed in view of the proposed claim amendments in order to distinguish the cited prior art. Specifically, Applicants' representatives discussed the claim limitation of a rapidly heatable inside tube with defined cold and hot portions in combination the unique structural arrangement of the present invention.

Disposition of the Claims.

Claims 1-16 and 18-34 are pending in the instant application. Claim 17 has been cancelled without prejudice or disclaimer and claims 1-16 and 18-34 remain rejected based on prior art.

Summary of Prior Art Rejections.

The Examiner has rejected claims 1-6, 8-11, 13-14, 17, and 29-34 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 2,878,360 to Tavender ("Tavender"). Further, the Examiner has rejected claim 7 under 35 U.S.C. §103(a) as being unpatentable over the Tavender reference in view of U.S. Patent No. 6,068,703 to Chen et al ("Chen"). Additionally, the Examiner has rejected claims 12, 15, 16, and 18 under 35 U.S.C. §103(a) as being unpatentable over Tavender. Further, the Examiner has rejected claims 19-27 under 35 U.S.C. §103(a) as

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being unpatentable over the Tavender reference taken in view of U.S. Patent No. 6,516,142 to Grant et al. ("Grant"). Finally, the Examiner has rejected claim 28 under 35 U.S.C. §103(a) as being unpatentable over the Tavender reference in view of the Grant reference and further in view of the U.S. Patent No. 5,178,651 to Balma et al. ("Balma").

Applicants' Newly Amended Claims are Not Anticipated By the Tavender Reference.

The Examiner has rejected claims 1-6, 8-11, 13-14, 17, and 29-34 as being anticipated by the Tavender reference.

The Examiner contends that Tavender discloses a fluid heat exchanger comprising an inside tube (11b) concentrically surrounded by an outside tube (11a) defining a small fluid passageway of annular cross section therebetween. The Examiner further claims that the Tavender reference discloses a temperature control system comprising a thermistor in the fluid passageway for monitoring and controlling the temperature of the fluid within a predetermined range. The Examiner goes on to assert that the inner tube includes an electric heater coil therein and a helically coiled wire interposed between the inner and outer tubes. With respect to claim 14, the Examiner argues that the limitation of the heated fluid consisting of carbon dioxide is considered to be an "intended use" and does not distinguish the present invention over the cited prior art.

A review of the Tavender reference reveals that fluid is heated along the entire length of the passageway defined by the outer and inner tubes due to a heating element ("11C" and "11C'" in FIG. 3) that extends up and out of the opposing ends of the inside and outside tubes before being connected to a power

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source or cold portion (11A and 11B respectively). See Col. 2, lines 45-50, and FIGS. 1-3. Further, Tavender teaches connecting the heating element to the power source outside the tubular arrangement of the heater, thereby positioning the cold portion of the heating element outside the tubular arrangement which necessarily requires that the cold portion of the heating element be completely uncovered by the outside tube of the heater. Since the cold portion of the heating element of Tavender is outside of the inner tube, fluid must be heated along the entire length of the inner tube which requires that the entire length of the passageway be heated as recited in Tavender in order to produce steam that is free from condensation at a nozzle as taught by the reference. See Col. 4. lines 53-54; Id at Col. 3, lines 60-37.

In response, the Applicants have amended their claims to recite a heat exchanger having a cold portion connected to opposing ends of the hot portion such that the outside tube covers both the cold and hot portions. Specifically, independent claims 1, 19, 29, and 34 have been amended to include the limitation of a rapidly heatable inside tube comprising a hot portion with opposing ends connected to a cold portion. Further amendment to these claims include the limitation that the hollow outside tube surrounds both the hot portion and the cold portion of the rapidly heatable inside tube. Finally, claims 1, 19, 29, and 34 have been amended to include the limitation that fluid is continuously heated as it passes over the hot portion of the inside tube including the portion of the inside tube that forms an axial curvature. Applicants aver that no new matter has been introduced by these amendments since FIGS. 1 and 7 clearly show that the outside tube surrounds both hot portion and the cold portion of the

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inside tube creating a fluid passageway with unheated and end sections.

These amended claims presently recite a heat exchanger having an inside tube that surrounds both the cold and hot portions of the inside tube with the outside tube. In contrast, the outside tube disclosed by Tavender does not surround the cold portion of the heating element at all; therefore the entire length of the fluid passageway must be heated in order to bring fluids to the desired temperature. The heat exchanger of the present invention heats fluid to supercritical temperatures without the cold portion of the heating element being physically separated from the tubular arrangement of the heat exchanger as required by the Tavender reference.

Based on the foregoing, the Examiner is respectfully requested to withdraw his rejection of independent claims 1, 29, and 34 as being anticipated by Tavender and indicate the allowance thereof. Further, Applicants respectfully request that dependent claims 2-6, 8-11, 13-14, and 30-33 be allowed by virtue of their respective dependencies to amended independent claims.

**Applicants' Newly Amended Claim 7 is Patentable Over the
Tavender Reference in View of the Chen Reference.**

The Examiner has rejected dependent claim 7 under 35 U.S.C. §103(a) as being unpatentable over Tavender in view of Chen et al.

Specifically, the Examiner contends that Tavender discloses the invention substantially as claimed in claim 7; however, the Examiner admits that the Tavender reference does not explicitly

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disclose an electropolished finish to the surfaces of the channel. As noted above, independent claim 1 which claim 7 depends therefrom has been amended to overcome the prior art cited by the Examiner. As such, dependent claim 7 should be allowable by virtue of its dependency to independent claim 1.

Based on the foregoing, the Examiner is respectfully requested to withdraw his rejection of dependent claim 7 as being unpatentable over Tavender taken in view of Chen et al. and indicate the allowance thereof.

Applicants' Newly Amended Claims 12, 15, 16, and 18 are Patentable and Not Obvious in View of the Tavender Reference.

The Examiner has rejected dependent claims 12, 15, 16, and 18 under 35 U.S.C. §103(a) as being obvious in view of Tavender. Specifically, it is the Examiner's contention that the Tavender reference discloses the invention as substantially claimed except that instead of using a raised helical portion formed from the inside tube as is presently claimed, Tavdender uses a separate helical wire interposed between the inner and outer tubes which creates a raised region. The Examiner concludes that it would have been obvious to make the helical wire an integral part of the tube surface.

As noted above, claim 1 has been amended in order to distinguish the fluid heat exchanger of the present invention from the Tavender reference. Therefore, dependent claims 12, 15, 16, and 18 would be allowable based upon their respective dependencies upon independent claim 1 and the Examiner is respectfully requested to indicate the allowance thereof.

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Applicant's Newly Amended Claims 19-27 are Patentable Over the
Tavender Reference In View of the Grant Reference.

The Examiner has rejected dependent claims 19-27 under 35 U.S.C. §103(a) as being unpatentable over Tavender in view of Grant.

Specifically, the Examiner contends that Tavender discloses the invention substantially as claimed except that Tavender does not explicitly disclose a temperature sensor within the outer tube as is disclosed by Grant. As noted above, independent claim 19 has been amended to include the limitation of an outside tube that surrounds both the cold and hot portions of the inside tube. Therefore, it would not be obvious to combine the teachings of Grant with the Tavender reference and arrive at the present invention as claimed in claim 19. As such, the Examiner is respectfully requested to withdraw his rejection of claim 19 as being an obvious modification of the Tavender reference when viewed with the Grant reference. Further, Applicants respectfully request that dependent claims 20-27 be allowed by virtue of their respective dependencies to amended claim 19.

Amended Claim 28 is Patentable Over the Tavender Reference In
View of Grant and Further In View of Balma et al.

The Examiner has rejected dependent claim 28 under 35 U.S.C. §103(a) as being unpatentable over Tavender in view of Grant and further in view of the Balma reference.

Specifically, the Examiner contends that the Tavender reference in view of Grant disclose the invention substantially as claimed with the exception that neither reference discloses a

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temperature sensor positioned in a raised region of the outer tube. The Examiner believes that the Balma reference discloses such a sensor arrangement and that it would have been obvious to modify the teachings of Tavender and Grant and arrive at the present invention as claimed in claim 28.

As noted above, independent claim 19 to which dependent claim 28 depends therefrom has been amended to overcome the prior art. Therefore, dependent claim 28 would be allowable based upon its respective dependency from independent claim 19.

Conclusion

By the present response, the Applicants have provided remarks and made amendments to the claims that distinguish the claimed invention from the cited prior art. Applicants have amended claims 1, 19, 29, and 34 to include limitations directed to a fluid heat exchanger with a rapidly heatable inside tube with a hot portion having opposing ends with a cold portion attached to each end with an outside tube that surrounds both the hot and cold portions of the inside tube.

If the Examiner has any comments or suggestions which would place the application in still better condition for allowance, he is respectfully requested to call the undersigned attorney collect.

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Respectfully submitted,

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